REMARKS

Reconsideration of the April 4, 2002 Official Action is respectfully requested.

Applicants reaffirm the election of the invention covered by Claims 1-10. The new claims submitted herewith are directed to the elected invention. The non-elected claims (Claims 11-20) have been canceled without prejudice or disclaimer of the subject matter thereof.

In response to the objection to the drawings, submitted herewith is a proposed drawing correction wherein FIG. 2 has been revised to delete one of the reference numbers' 10. Also submitted herewith is a new formal drawings to incorporate the proposed drawing revision. In view of the submission of the proposed drawing revision, withdrawal of the objection to the drawings is respectfully requested.

Claims 1 and 5-7 were rejected under 35 USC §102(b) as allegedly being anticipated by Japanese Patent Publication No. 2-20018 ("Murai"). The reasons for the rejection are set forth on pages 3-4 of the Official Action. This rejection is respectfully traversed for the following reasons.

Claim 1 sets forth a low resistivity silicon electrode adapted to be mounted in a plasma reaction chamber used in semiconductor substrate processing, comprising a silicon electrode having a thickness of at least about 0.3 inch an electrical resistivity of less than 1 ohm-cm, the electrode having an RF driven or electrically grounded surface on one side thereof, the surface being exposed to plasma in the plasma reaction chamber during use of the electrode. The combinations of features recited in Claim 1 and in the claims dependent thereon are not disclosed or suggested by Murai.

As set forth in the Official Action, Murai is cited for disclosure of a low resistivity electrode adapted to be mounted in a parallel plate plasma reaction chamber, the electrode comprising a single crystal silicon electrode having an electrical resistivity of less than 0.05 ohm-cm. The English language Abstract of Murai, however, fails to disclose or suggest the combination of features recited in Claim 1 which includes a silicon electrode having a thickness of at least about 0.3 inch.

As explained in the present application, the low resistivity electrode according to the invention can reduce center-to-edge temperature variation across the electrode and thereby obtain better process uniformity particularly in the case where the electrode is made thicker than conventional electrodes (see specification at page 13, lines 15-19). For example, the electrode can have an increased thickness of 0.375 or even 0.50 inch compared to a conventional 0.25 inch thick electrode (specification at page 13, lines 19-21). Rounding the 0.375 inch to one decimal point provides support for the claimed thickness of at least about 0.3 inch. The electrode can be backed with a backing member and attached to a support assembly of a support ring such as a graphite ring and a baffle arrangement in which case the electrode can be backed with a backing plate made of a suitable heat conducting material such as aluminum or alloy thereof, silicon carbide, graphite or the like (specification at page 13, lines 21-26).

The backing plate can be attached to the electrode by any suitable manner including bonding such as by an elastomer bond (see specification at page 13, lines 28-30). In the case where the electrode is a showerhead electrode, gas outlets can be formed therein by ultrasonically drilling using a slurry (see specification at page 14, lines 4-18). Further, in

the case where a backing plate is attached to such a showerhead electrode, the backing plate can include gas distribution holes communicating with those in the electrode (see specification at page 15, lines 5-10). However, the electrode can be free of gas outlets in the case where the electrode is a grounded or powered electrode in a plasma chamber (see specification at page 15, lines 12-14).

Murai fails to suggest the claimed electrode having a thickness of at least about 0.3 inch. As explained above, reduced center-to-edge temperature variation across the electrode and better process uniformity can be obtained by making the electrode thicker than conventional electrodes (see specification at page 13, lines 15-19). Accordingly, it is submitted that Claim 1 and the claims dependent thereon are clearly patentable over Murai.

Claims 1-3 and 5-7 were rejected under 35 USC §102(b) as allegedly being anticipated by U.S. Patent No. 5,993,597 ("Saito"). The reasons for the rejection are set forth on page 4 of the Official Action. This rejection is respectfully traversed for the following reasons.

According to Saito, a silicon-crystal silicon or polycrystalline silicon having an electric resistance of 0.0001-40 ohm-cm is subjected to chemical etching to reduce the strain and microcracks and thereby achieve reduction in dust generation (column 2, lines 15-54). After chemical etching, a heat treatment in vacuum is conducted as a final step to further reduce the microcracks and decompose the acid from the chemical etching step (column 2, lines 59-67). In the examples, the single-crystal silicon electrode has a thickness of 0.5 mm and includes 788 holes of 0.5 mm in diameter at a hole-to-hole distance of 7 mm. A thickness of 5 mm corresponds to less than 0.2 inch. Accordingly,

the electrode disclosed in Saito is thinner than a conventional 0.25 inch thick electrode and much thinner than the claimed electrode. Moreover, Saito fails to provide any recognition of any advantages of thick electrodes. As explained above, the low resistivity thick electrode according to the invention can provide reduced center-to-edge temperature variation across the electrode and thereby obtain better process uniformity. As such, it is submitted that Claim 1 and the claims dependent thereon are clearly patentable over Saito.

It is submitted that the differences between the claimed subject matter and the prior art are such that the claimed subject matter, as a whole, would not have been obvious at the time the invention was made to a person having ordinary skill in the art.

In view of the foregoing, it is submitted that the present application is in condition for allowance and such action is earnestly solicited.

Respectfully submitted,

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Attachment to AMENDMENT

Marked-up Claim 1

1. (Amended) A low resistivity silicon electrode adapted to be mounted in a plasma reaction chamber used in semiconductor substrate processing, comprising:

a silicon electrode having a thickness of at least about 0.3 inch an electrical resistivity of less than 1 ohm-cm, the electrode having an RF driven or electrically grounded surface on one side thereof, the surface being exposed to plasma in the plasma reaction chamber during use of the electrode.